

CLAIMS

1. A computer program product, tangibly embodied in an information carrier, the computer program product comprising instructions operable to cause data processing apparatus to perform operations comprising:

5 detecting multiple changes to a user interface of a computer program, the user interface having multiple user interface elements, each change being a change to one of the multiple user interface elements;

 generating a rendering request for each change, each rendering request specifying the user interface element that has changed and a type of modification to be performed on the
10 user interface element; and

 filtering the requests to eliminate redundant requests.

2. The product of claim 1, wherein each rendering request is a request to modify a data structure representing the user interface.

3. The product of claim 2, wherein the data structure is a document object model
15 representation of the user interface.

4. The product of claim 1, wherein:

 the type of modification is a complete re-rendering of the user interface element.

5. The product of claim 1, wherein:

 the type of modification is an update of one or more, but not all, of the attributes of
20 the user interface element.

6. The product of claim 1, wherein the operations further comprise:

 rendering the user interface based on the filtered requests.

7. An apparatus comprising:

means for detecting multiple changes to a user interface of a computer program, the user interface having multiple user interface elements, each change being a change to one of the multiple user interface elements;

5 means for generating a rendering request for each change, each rendering request specifying the user interface element that has changed and a type of modification to be performed on the user interface element; and

means for filtering the requests to eliminate redundant requests.

10 8. The apparatus of claim 7, wherein each rendering request is a request to modify a data structure representing the user interface.

9. The apparatus of claim 7, wherein the data structure is a document object model representation of the user interface.

10. The apparatus of claim 7, wherein:

the type of modification is a complete re-rendering of the user interface element.

15 11. The apparatus of claim 7, wherein:

the type of modification is an update of one or more, but not all, of the attributes of the user interface element.

12. The apparatus of claim 7, further comprising:

means for rendering the user interface based on the filtered requests.

13. A system comprising:

a Web page rendered in a Web browser, the Web page including one or more user interface elements;

a document object model representation of the Web page, and

5 a framework running in the browser, the framework including:

one or more trees that store the visualization of the Web page, each user interface element being associated with a portion of the document object model representation and with a portion of the tree; and

a filtering mechanism for filtering rendering requests, each rendering request
10 specifying a user interface element that has changed and a type of modification to be performed on the portion of the document object model representation associated with the specified user interface element.

14. The system of claim 13, wherein the trees include a UI tree, a data tree, or both.